REMARKS

Claims 1-57 were presented for examination and were pending in this application. In an Office Action dated December 11, 2003, claims 1-57 were rejected. Applicants thank Examiner for examination of the claims pending in this application and address Examiner's comments below. Applicants also thank Examiner for considering the references submitted in the Information Disclosure Statements filed on June 27, 2002, and March 13, 2003. In addition, Applicants note that an additional Supplemental Information Disclosure Statement was filed on June 19, 2003. However, Examiner has not acknowledged consideration of the references cited therein. Applicants kindly request written confirmation to indicate that the references cited in the Supplemental Information Disclosure Statement filed on June 19, 2003, have been considered. A copy of this submission with the corresponding receipt postcard is attached herein.

Applicants herein amend claims 1, 25, 26, 27, 32, 35, 40, 45, 47, and 54. Applicants cancel claims 44, 46, 49, and 50 and add new claim 58. These changes are believed not to introduce new matter, and their entry is respectfully requested. The claims have been amended to expedite the prosecution of the application in a manner consistent with the Patent Office Business Goals, 65 Fed. Reg. 54603 (Sept. 8, 2000). In making these amendments, Applicants have not and do not narrow the scope of the protection to which Applicants consider the claimed invention to be entitled and do not concede that the subject matter of such claims was in fact disclosed or taught by the cited prior art. Rather, Applicants reserve the right to pursue such protection at a later point in time and merely seeks to pursue protection for the subject matter presented in this submission.

Based on the above Amendment and the following Remarks, Applicants respectfully request that Examiner reconsider all outstanding objections and rejections, and withdraw them.

Objection to the Title

The Examiner has objected to the title as not being descriptive. Applicants have amended the title in accordance with the Examiner's comments to correct the informalities noted by the Examiner. In particular, Applicants have amended the title to now recite "An Optical Based Performance Improvement for an Optical Illumination Configuration," which is indicative of optical-based performance improvement systems and methods of the present invention. This is at least one of the many features that distinguish the present invention from conventional optical illumination systems. Accordingly, Applicants respectfully request that Examiner reconsider and withdraw the objection to the title.

Response to Rejection Under 35 USC 102(e)

In the 4th paragraph of the Office Action, Examiner rejects claims 1-2, 4-7, 9-15, 18-22, 25-37, 40-44, 46-47, 49-51 and 54-57 under 35 USC § 102(e) as allegedly being anticipated by U.S. Patent No. 6,531,692 to Adan et al. ("Adan"). This rejection is now traversed.

Representative claim 1 recites a system for illuminating a target surface comprising:

> a light source, positioned at a first angle relative to a circuit board, the light source configured for emitting light to illuminate the target surface; and
> a lens having an entrance surface and an exit surface, the entrance surface positioned to gather the light from the light source and the exit surface directing the light onto the target surface, wherein the entrance surface and the exit surface are positioned at a second angle relative to each other, the second angle dimensioned to fold a light beam from a first

direction associated with the angle of the light source relative to the circuit board to a second direction associated with an impinging angle for illuminating the target area.

Similar claim features relating to light source angles and light beam folding or refraction are included in the following independent claims. For example, claim 18 recites a method of manufacturing an efficient illumination system for illuminating a surface comprising:

placing a light source at an angle relative to the surface, the light source for emitting light; and
positioning a refractive lens, the refractive lens gathering light from the light source and directing the light directly to the surface.

In like manner, claim 25 recites a method for illuminating a surface comprising:

emitting light at a first angle relative to the surface;
gathering the light; and
directing the light at a second angle onto the surface using a refractive lens.

In addition, claim 27 recites a system for illuminating a surface comprising:

a light emitting means for emitting light, the light emitting means tilted at a first angle relative to the surface;
a gathering means for gathering the light from the light source; and
a directing means for directing the light at a second angle onto the surface.

Similarly, claim 32 recites a refractive lens comprising:

a first curvatured surface, positioned to gather light; and
a second curvatured surface, coupled to the first surface, shaped for directing the light in an optical illumination system to a target surface, wherein the first surface and the second surface are positioned at an angle relative to each other, the angle dimensioned to fold a light beam from a first direction associated with a light source to a second direction associated with an impinging angle for illuminating the target surface using refraction.

Claim 40 also recites an illumination system, however the system of claim 40 uses total internal reflection and comprises:

> an entrance surface, positioned to gather light from a light source positioned at a first angle with respect to a target surface;
> a truncated light pipe, coupled to the entrance surface, for directing the light gathered at the first angle by reflecting at a second angle off a first reflective surface meeting a total internal reflection condition; and
> a curvatured exit surface, coupled to the truncated light pipe, for efficiently directing the light onto the target surface.

Likewise, claim 54 recites an illumination method comprising:

> gathering light at a first end of a truncated light pipe; and
> directing the light onto a surface using the truncated light pipe comprising a first reflective surface positioned to meet a total internal reflection condition with respect to the gathered light.

Additionally, claim 57 also recites an illumination system, which is for use in a displacement detection computer pointing device and comprises:

> a circuit board;
> a light emitting diode at a first angle relative to the circuit board; and
> a lens aligned with the light emitting diode for focusing the light at a second angle onto a surface, the lens comprising an aspherical entrance surface and a cylindrical exit surface.

As recited in claims 1, 18, 25, 27, 32, 40, 54 and 57 a light source (e.g., a light emitting diode) is positioned at a first angle with respect to a surface or circuit board and a lens is used to fold, refract, direct, or focus the light at a second angle to a surface. This beneficially increases the flexibility of manufacturing and significantly reduces the length of the optical system. These advantages are a product of using a tilted light source that is interfaced with a beam-folding lens, such as for example, a refractive lens or a truncated light pipe. The beam folding or redirection is accomplished for example by positioning the entry and exit surfaces of the illumination lens at an angle with respect to each other, such as in a

wedge-shape, truncating plane, or similar configuration. In addition, the reduction in size permits smaller lens parts to be used, which use less optical material in manufacturing, less injection time, and a smaller mold, and therefore, reduces cost.

In contrast, Adan simply shows an illumination system with an illumination lens (optical coupler 107) having "sufficient length to remove the radiation source 104 from aperture 106 by an amount which reduces the likelihood that electrostatic discharge will reach any exposed leads or wires within housing 102." (Adan, 11:40-45). Further, in Adan's system, "it is important that optical coupler 107 and source 107 be well aligned with one another." (Adan, 11:54-55). Thus, as can be seen in several of the Figures in Adan, for example in Fig. 6, the coupler's entrance 142 and exit 144 surfaces are generally parallel, not "positioned at a second angle relative to each other" and a light beam from LED 104 is not "folded" or "refracted" as recited in the claims of the present invention. Further, Adan teaches the use of a longer "central portion" to reduce the likelihood of electrostatic discharge ("ESD"), which directly contradicts the design advantages of smaller optical components provided by the present invention. There is no indication in Adan of using any optic features, such as for example a wedge-shaped body, a truncated surface, or the like, to reduce the size of the illumination lens because Adan finds the longer illumination lens to be advantageous from an ESD protection perspective.

Further, Applicants note that in the fourth paragraph of the Office Action, Examiner points out that "the shape of the lens (155) [shown in Adan] fairly reads on the limitation disclosed in the claims" as it relates to claims 2 and 4. However, lens (155) in Adan is not a illumination lens, "positioned to gather light from the light source" and for "directing light onto the target surface." Rather, lens 155 is an imaging lens through which light is reflected

upwardly to impinge upon image detector 110 (Adan, 12:24-27). Thus, neither its shape nor its description or function read on the "refraction" (e.g., folding, directing, or focusing at a second angle) limitation recited in the claims.

In a rejection under 35 U.S.C. §102, each and every claim element must be present in the applied reference. However, the reference cited by Examiner fails to point out any prior "refractive lens," "truncated light pipe," "directing light at a second angle," or "fold[ing] a light beam from a first direction associated with the angle of the light source relative to the circuit board to a second direction associated with an impinging angle" as recited in the claims. Therefore, it is respectfully submitted that the rejection is improper and should be withdrawn.

Thus, based on the above Amendments and Remarks, Applicants respectfully submit that for at least these reasons independent claims 1, 18, 25, 27, 32, 40, 54, and 57 are patentably distinguishable over the cited reference. In addition, as claims 2-17, 19-22, 26, 28-31, 33-37, 41-43, 47, 51, 55, and 56 are dependent on the above independent claims, all arguments advanced above with respect to claims 1, 18, 25, 27, 32, 40, 54, and 57 are hereby incorporated so as to apply to their dependent claims. Therefore, Applicants respectfully submit that claims 1-17, 18-22, 25-37, 40-43, 47, 51, and 54-57 are patentably distinguishable over the cited reference and respectfully request that Examiner reconsider the rejection, and withdraw it.

Response to Rejections Under 35 U.S.C. 103(a)

In the 6th paragraph of the Office Action, Examiner rejects claims 45 and 48 under 35 U.S.C. § 103(a) as allegedly being unpatentable in view of Adan. This rejection is respectfully traversed.

Claims 45 and 48 recite a reflective surface having "a metal coating." Claims 45 and 48 are dependent from claim 40 and all arguments advanced above with respect to claim 40 are hereby incorporated so as to apply to claims 45 and 48. Thus, Adan fails to anticipate the features described above with respect to claim 40. Further, as Examiner states in the Office Action, Adan fails to describe "the citation of having the first and the second reflective surfaces have a metal coating."

Adan shows the light from the LED 104 reflected from the surface 107 in Fig. 5. However, this does not indicate a surface with a high reflectivity (i.e., metal surface) as indicated in the Office Action. An equally likely assumption is that the angle of incidence is above the threshold angle for total internal reflection, which depends on the refractive index variation between the two interfacing media, e.g., glass and air, and is not necessarily related to the reflective characteristics of the surface. Thus, one of ordinary skill in the art would not have been motivated to make the reflective surface of metal simply because some reflection is shown in Fig. 5.

Therefore, for at least the above reasons, Applicants respectfully submit that claims 45 and 48 are patentably distinguishable over the cited reference and respectfully request that Examiner reconsider the rejection, and withdraw it.

In the 7th paragraph of the Office Action, Examiner rejects claims 3 and 8 under 35 USC § 103(a) as allegedly being unpatentable in view of Adan and U.S. Patent No. 6,476,970 to Smith ("Smith"). This rejection is respectfully traversed.

Claims 3 and 8 are dependent from claim 1, thus, all arguments advanced above with respect to claim 1 are hereby incorporated so as to apply to claims 3 and 8. Hence, with respect to claims 3 and 8, Adan fails to anticipate the features described above with respect to

claim 1. Further, claim 3 recites a system "wherein the lens directs the light onto the target surface using a Fresnel lens." Similarly, claim 8 recites a system "wherein the lens is wedge-shaped." Adan teaches a system having an illumination lens (optical coupler 107) and a light source (LED 104) that are mounted as follows:

> ... ramp 152 that includes a generally inclined tunnel for receiving the outlet end 144 of optical coupler 107. Support housing 154 ... receives LED 104. Housing 154 includes locator posts ... that are disposed within corresponding apertures in a circuit board 158. ... [H]ousing 154 is disposed at an angle relative to work surface 116 which is generally similar to that at which optical coupler 107 is disposed.

(Adan, 12:7-20). However, Adan fails to disclose the use of a system "wherein the lens directs the light onto the target surface using a Fresnel lens" or "wherein the lens is wedge-shaped." Examiner cites Smith for its disclosure of the use of a Fresnel lens and wedge shapes in an illumination lens. Smith teaches using a Fresnel lens as a collimating surface for the entry surface of the illumination lens (Smith, 4:30-33). However, Smith teaches away from the use of its lens designs with a "tapered light pipe" system, such as the system shown in Adan, which requires a special housing. According to Smith:

> this approach offers a design very little control over the routing and angular distribution of the resulting light. The approach also has the following additional disadvantages. First, since the light pipe needs to be an angle relative to the surface to be illuminated, both the light source and light pipe require special mounting to meet these angle requirements, thereby increasing the manufacturing costs. Second, the light travels through the light pipe, the angle of the light beams increases every time the light beam is reflected off of one of the walls of the light pipe. Consequently, the output light beam has a high degree of divergence that results in a high angle of incidence with the surface of illumination. This high angle of incidence may cause certain contrasts resulting from certain types of surfaces to be washed out or negated by the illumination beams, thereby leading to poor performance of the optical mice on certain surfaces.

(Smith, 1:66-2:15).

Therefore, the tapered light pipe with special housing of Adan is inconsistent with the simplified lens system of Smith and would lead one of ordinary skill in a direction divergent from the claimed invention. Accordingly, Smith teaches away from the claimed invention and cannot be properly used as a reference rejecting the present claims since by teaching away it does not provide any teaching or suggestion to combine. In re Gurley, 31 USPQ 1130, 31 (Fed. Cir. 1994). *See also*, In re Fine, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988). "[E]lements of separate prior patents cannot be combined when there is no suggestion of such combination anywhere in those patents...; and a court should avoid hindsight .... Likewise, the teaching of [the cited references] are inconsistent with the claimed invention" (emphasis added; annotations within square brackets). Panduit Corp. v. Dennison Mfg. Co., 1 USPQ2d 1593, 1597 (Fed. Cir. 1987), citing ACS Hospital Systems, Inc. v. Montefiore Hospital, 220 USPQ 929, 933 (Fed. Cir. 1984).

For all of the above reasons, Applicants respectfully assert that claims 3 and 8 are patentable over Adan and/or Smith, and that the combination is improper in any case, and therefore, respectfully request that Examiner reconsider and withdraw the rejection.

In the 8th paragraph of the Office Action, Examiner rejects claims 16-17, 23-24, 38-39 and 52-53 under 35 USC § 103(a) as allegedly being unpatentable in view of Adan and U.S. Patent No. 6,084,574 to Bidiville ("Bidiville"). This rejection is respectfully traversed.

Claims 16-17 depend from claim 1, claims 23 and 24 depend from claim 18, claims 38 and 39 depend from claim 32, and claims 52 and 53 depend from claim 40. As such, all the arguments advanced above with respect to claims 1, 18, 32, and 40 are hereby incorporated so as to apply to claims 16-17, 23-24, 38-39 and 52-53. Hence, with respect to

claims 16-17, 23-24, 38-39 and 52-53, Adan fails to anticipate the features described above with respect to claims 1, 18, 32, and 40. Bidiville teaches a compact cursor pointing device utilizing Photodetector array that includes a lens. Assuming, *arguendo*, that Bidiville, if properly combined, teaches a lens made from glass or optical plastic, it still fails to teach the aforementioned features not taught by Adan with respect to claims 1, 18, 32, and 40. Thus, neither Alan nor Bidiville, alone or in combination, anticipate all the elements of claims 16-17, 23-24, 38-39 and 52-53.

For all of the above reasons, Applicants respectfully assert that claims 16-17, 23-24, 38-39 and 52-53 are patentable over Adan and/or Bidiville, and therefore respectfully request that Examiner reconsider and withdraw the rejection.

Conclusion

In sum, Applicants respectfully submit that claims 1-43, 45, 47, 48, and 51-58 as presented herein, are patentably distinguishable over the cited references (including references cited, but not applied). Therefore, Applicants request reconsideration of the basis for the rejections to these claims and request allowance of them.

In addition, Applicants respectfully invite Examiner to contact Applicants' representative at the number provided below if Examiner believes it will help expedite furtherance of this application.

Respectfully Submitted,
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